Supplementary Information

Fluid pumping of peristaltic vessel fitted with elastic valves

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Movie 1: Axial flow velocity U_x in a valve-less peristaltic vessel without an adverse pressure gradient (top) and with an adverse pressure gradient $\Delta P = 140$ (bottom) yielding respective flow rates $Q = 0.15$ and $Q = -0.22$. The contraction ratio is $\phi = 0.2$, and the peristaltic Reynolds number is $Re = 0.2$.

Movie 2: Valve deformation in a contracting peristaltic vessel with an adverse pressure gradient $\Delta P = 140$. The simulation parameters are $\phi = 0.2$, $Re = 0.4$, $K_b = 88$, and $K_s = 115$.

Movie 3: Axial flow velocity U_x in a valved vessel without an adverse pressure gradient (top) and with an adverse pressure gradient $\Delta P = 140$ (bottom). The simulation parameters are $\phi = 0.2$, $Re = 0.2$, $K_b = 88$, and $K_s = 115$.

Movie 4: Valve deformation in a valved vessel without an adverse pressure gradient (top) and with an adverse pressure gradient $\Delta P = 140$ (bottom). The simulation parameters are $\phi = 0.2$, $Re = 0.2$, $K_b = 88$, and $K_s = 115$.

Movie 5: Axial flow velocity difference ΔU_x in a valved vessel without an adverse pressure gradient (top) and with an adverse pressure gradient $\Delta P = 140$ (bottom). The simulation parameters are $\phi = 0.2$, $Re = 0.2$, $K_b = 88$, and $K_s = 115$. The flow velocity difference ΔU_x is calculated as the difference between flow velocities in vessels with and without valves.

Movie 6: Deformation of elastic valves with $K_b = 11$ (top), $K_b = 88$ (middle), and $K_b = 263$ (bottom) over a vessel contraction cycle. The simulation parameters are $\Delta P = 140$, $\phi = 0.2$, $Re = 0.4$, and $K_s = 115$.

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